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| 10/032,682  | 12/28/2001  | Daniel P. Johnson    | (256.114US1)             | 7301             |
| 21186   | 7590        | 07/20/2006           | EXAMINER                 |                  |
| SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.<br>P.O. BOX 2938<br>MINNEAPOLIS, MN 55402 |             |                      | MEINECKE DIAZ, SUSANNA M |                  |
|   |             |                      | ART UNIT                 | PAPER NUMBER     |
|   |             |                      | 3623                     |                  |
| DATE MAILED: 07/20/2006   |             |                      |                          |                  |

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/032,682

**Applicant(s)**

JOHNSON, DANIEL P.

**Examiner**

Susanna M. Diaz

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 02 May 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

1. This final Office action is responsive to Applicant's amendment filed May 2, 2006.  
Claims 1, 6, and 12 have been amended.  
Claims 1-20 are presented for examination.

### ***Response to Arguments***

2. Applicant's arguments filed May 2, 2006 have been fully considered but they are not persuasive.

Applicant argues that the claimed invention is useful under 35 U.S.C. § 101 because the background of the specification provides various examples of scheduling (pages 7-8 of Applicant's response); however, the claims do not clearly set forth how scheduling occurs. The claimed invention effectively jumps from listing undefined variables, relationships, and constraints to solving a scheduling problem without any details regarding how such a goal is accomplished. This is analogous to providing someone with a recipe to make a "Novel Dessert" with only a general reference to "ingredients related to making desserts" (without any specific ingredient names, measurements, mixing instructions, or baking instructions). Without knowledge of the scope of scheduling, it is unclear whether the extent of scheduling is sufficient enough to be useful. Once the § 112, 1<sup>st</sup> and 2<sup>nd</sup> paragraph issues are resolved, the question of usefulness will likely be clarified as well.

As far as the concreteness of the claimed invention is concerned, by Applicant's own admission, "each plant likely has different sets of variables and constraints, and the

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identification and selection of such are not a part of the invention.” (Page 8 of Applicant’s response) In order for the invention to be concrete, the claimed invention must produce a result that is substantially repeatable or reproducible. Since every permutation of variables, relationships, and constraints may be very different, Applicant has not demonstrated how a solution would be substantially repeatable or reproducible. Instead, varying problems could very well require varying solutions. Furthermore, the claimed invention is still a pure mathematical algorithm, which is merely an abstract idea since the specifics of how a practical application is achieved are not set forth in the claims.

As far as tangibility is concerned, there is no real-world effect produced by the claimed invention. For example, a solution can be found for a schedule without actually putting the schedule into practice.

Regarding the 112, 1<sup>st</sup> paragraph rejection of the claims, Applicant submits that “the variables recited in the claims may represent qualities, quantities, timing, and the like. Moreover, specific examples of one or more embodiments are provided in excruciating detail in the specification.” (Page 9 of Applicant’s response) Applicant’s claims appear to attempt to cover the scope of at least multiple embodiments; however, the extremely broad nature of the claims has caused the claimed invention to lose sight of the particulars of these disclosed embodiments. Applicant’s specification simply does not sufficiently address the scope of the claims. Applicant “further respectfully submits that one of skill in the art of business and/or operations management would, without undue experimentation, be able to select pertinent variables for their processes and

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apply them to the subject matter as disclosed in the present application.” (Page 9 of Applicant’s response) The Examiner emphasizes that such a feat must be accomplished without undue experimentation. Returning to the recipe example, given a list of commonly used baking ingredients, one might easily concoct various dessert, yet it would never be clear if one of these concocted desserts would be the inventor’s intended dessert. It is Applicant’s responsibility to clearly set forth Applicant’s intended invention in both the specification as well as the claims. The scope of Applicant’s disclosure does not explain how one cookie cutter model can address all of the potential embodiments without at least some basic modification to each model to take into account variables, relationships, and constraints that may be unique to each embodiment/model. Again, this is analogous to providing a listing of general, commonly used baking ingredients, and expecting someone to be able to guess how to make the intended “Novel Dessert.” The gaps that are missing in the claimed invention can be significantly different based on which variables, relationships, and constraints are used, which also vary widely based on which type of scheduling problem is being solved (e.g., scheduling for a manufacturing process or for operating an oil refinery). Ultimately, Applicant fails to convey the particular metes and bounds of the intended invention in the claim language. Admittedly, Applicant has various alternate embodiments in the specification. Without focusing on a specific embodiment, the claimed invention lacks any meaningful metes and bounds that clearly define its scope. Furthermore, the specification does not provide a genus that is sufficiently encompassing to consistently perform all of these embodiments (or species); therefore, the specification is lacking in

the level of detail of disclosure needed to support the scope of enablement required by the breadth of the claimed invention.

Regarding the rejection of claims 1-20 under 35 U.S.C. § 102(b), Applicant asserts that the "rejection does not state the grounds thereof fully and clearly, and furthermore amounts to an omnibus rejection. The Examiner at least has not identified where the last element in claim 1 is taught in the cited reference." (Page 10 of Applicant's response) First, due to the extensive nature of the rejections under 35 U.S.C. §§ 101 and 112, 1<sup>st</sup> and 2<sup>nd</sup> paragraphs, it has been difficult for the Examiner to assess the true metes and bounds of the invention; therefore, the art rejection has been presented to represent the Examiner's best understanding of the invention. Second, the Examiner has provided Applicant with a reference and cited specific chapters, thereby giving a little more than just an omnibus rejection of the claims. Regarding the step of "determining whether a solution to the scheduling problem is optimal, feasible, or infeasible," Hillier discusses a general approach for determining whether the solutions of a model are feasible or infeasible (see page 35). The goal is to identify an optimal solution (see page 36). Pages 57-60 of Hillier apply this analysis to a specific scheduling problem to find an optimal solution. Pages 62-63 of Hillier set forth a case study in a manufacturing environment for choosing a product mix on a monthly basis, which is also a type of scheduling problem. Also discussed (on pages 65-67 of Hillier) is an example of planning supply, distribution, and marketing at Citgo Petroleum Corporation (which manages oil refineries). Planning supply and distribution would necessarily require scheduling at some level.

In conclusion, Applicant's arguments are non-persuasive and the rejections are maintained.

***Claim Rejections - 35 USC § 101***

3. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. Claims 1-20 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

35 U.S.C. § 101 requires that the claims produce a final result that is useful, concrete, and tangible.

According to the utility requirement, the claimed invention has to be specific, substantial, and credible. Claims 1-20 are directed toward a mathematical formula without any specific, substantial, or credible result. The formula is never applied to yield a practical application. While claims 2-5 recite that the solution is a schedule for a manufacturing process, a schedule for operating an oil refinery, a plan for a manufacturing process, and a plan for operating an oil refinery, respectively, the claimed invention does not clarify how the mathematical operations are specifically adapted to yield a specific, substantial, or credible result in relation to a schedule or plan for a manufacturing process or for operating an oil refinery.

As per the tangibility requirement, the claimed invention must set forth a practical application that produces a real-world result. As discussed above, the claimed invention recites a mathematical formula without applying the formula to a specific

practical application with a real-world result. Even though claims 1-5 generally recite potential applications of the mathematical formula, there is never any express connection made between the equations and how they yield any results relevant to scheduling or planning. In other words, it is never made clear how the recited equations are adapted to a real-world application. Without relating the equation variables to a particular application that yields a result specific to that application, the equations are meaningless in a real-world context.

Regarding the concreteness requirement, the claimed invention must produce a result that is substantially repeatable or reproducible. Again, as discussed above, there is no meaningful result produced by the claimed invention. Consequently, the mathematical formula *per se* is abstract and, without any understanding of what the recited variables represent, the results of the claimed invention are not substantially repeatable or reproducible.

Claims 1-20 fail to produce a useful, concrete, and tangible result and are therefore deemed to be non-statutory.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.



6. Claims 1-20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Regarding the concreteness requirement under 35 U.S.C. § 101, the claimed invention must produce a result that is substantially repeatable or reproducible. As discussed above, there is no meaningful result produced by the claimed invention. Consequently, the mathematical formula *per se* is abstract and, without any understanding of what the recited variables represent, the results of the claimed invention are not substantially repeatable or reproducible. The Examiner has looked toward the specification for clarification of an intended practical application. While the specification generally states that the invention is used for scheduling or planning and provides some examples of specific applications (pages 4-11 of the specification), the details of the mathematical equations used as part of the invention as addressed on pages 11-42 of the specification are very generic in nature and never explain the significance of each variable with respect to each possible application of the equations. Consequently, one of ordinary skill in the art would not have known at the time of Applicant's invention how to make and/or use Applicant's intended invention.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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8. Claims 1-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1-20 are directed toward solving equations that are based on variables, relationships, and constraints that are never explicitly defined. Consequently, the intended metes and bounds of the claimed invention cannot be assessed. Without any particular context attributed to these variables, relationships, constraints, and equations, the scope of the claimed invention is ambiguous. The claims are very nebulous and abstract in nature; therefore, the Examiner is unable to focus on a clear and defined invention. For example, claims 2-5 recite that the solution is for a schedule or plan. How is a schedule or plan created merely by solving a set of non-convex equations and determining whether a solution is optimal, feasible, or infeasible. How is such an analysis applied to produce meaningful results in relation to a schedule or plan?

Please clarify the intended scope of the "global subdivision search." Does this term refer to an algorithm or mathematical operation invented by Applicant or is it a synonym for a well-known algorithm or mathematical operation, such as one relating to subdivision and global optimization or branch-and-bound algorithms for global optimization? For examination purposes, it will be assumed to be one of the well-known options.

Under 35 U.S.C. § 112, 2<sup>nd</sup> paragraph, Applicant is required to clearly point out and distinctly claim the intended invention. This requirement has not been met.

Appropriate correction is required.

*In light of the numerous rejections under 35 U.S.C. § 101 and 112, 1<sup>st</sup> and 2<sup>nd</sup> paragraphs, the following art rejection reflects Examiner's best understanding of the claimed invention.*

***Claim Rejections - 35 USC § 102***

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 1-20 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Hillier et al. (Introduction to Operations Research (6<sup>th</sup> ed)).

The claimed invention recites various old and well-known optimization techniques in the area of operations research, without any specific details of how these techniques are applied to a particular problem. The claimed techniques are addressed throughout Hillier. The table of contents and index as well as chapters 2, 3, and 13 have been provided to show the core concepts addressed by the claimed invention.

Regarding the step of “determining whether a solution to the scheduling problem is optimal, feasible, or infeasible,” Hillier discusses a general approach for determining whether the solutions of a model are feasible or infeasible (see page 35). The goal is to identify an optimal solution (see page 36). Pages 57-60 of Hillier apply this analysis to a specific scheduling problem to find an optimal solution. Pages 62-63 of Hillier set forth a case study in a manufacturing environment for choosing a product mix on a monthly

basis, which is also a type of scheduling problem. Also discussed (on pages 65-67 of Hillier) is an example of planning supply, distribution, and marketing at Citgo Petroleum Corporation (which manages oil refineries). Planning supply and distribution would necessarily require scheduling at some level.

### ***Conclusion***

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Susanna M. Diaz whose telephone number is (571) 272-6733. The examiner can normally be reached on Monday-Friday, 10 am - 6 pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tariq Hafiz can be reached on (571) 272-6729. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
Susanna M. Diaz  
Primary Examiner  
Art Unit 3623

July 17, 2006